UNITED STATES PATENT AND TRADEMARK OFFICE

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10/538,621	06/10/2005	Laurence Germond-Rouet	FR 020142	8956

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EXAMINER
WEATHERBY, ELLSWORTH

ART UNIT	PAPER NUMBER
3768	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
	10/538,621	GERMOND-ROUET ET AL.
Office Action Summary	Examiner	Art Unit	
	Ellsworth Weatherby	3768	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS,
WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _26 October 2007_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-7 and 9-17_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-7 and 9-17_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage

application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _10/01/2007_.

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Response to Arguments

1.   Applicant's arguments with respect to claims have been considered but are moot

in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3.   Claims 1, 7, 11, and 13-14 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Bonnefous (USPN 5,938,606) in view of Bonnefous (USPN

5,579,771).

Bonnefous '606 teaches an ultrasonic image processing system, for processing

images in an image sequence representing a segment of artery explored along its

longitudinal axis, said artery segment showing moving walls (col. 3, ll. 66-67; col. 4, ll. 1-

15); this system comprising: semi-automatic detection means for detecting the artery

walls in an image of the sequence (col. 4, ll. 25-31); automatic rigid tracking means for

tracking the corresponding artery walls in other images of the sequence (col. 4, ll. 36-

67; col. 5, lines 1-5); evaluation means for evaluating the artery wall motion (col. 5, lines

6-8) and also a viewing means for visualizing images where a physician can

qualitatively or quantitatively determine artery elasticity (col. 9, lines 29-41). Bonnefous
'606 also teaches computation means for calculating the dilation of the artery along the
ultrasound beams in the images of the sequence using the segmentation of the walls
performed by path finding within semi-automatic detection and rigid tracking (col. 1, ll.
52-60; col. 8, ll. 27-50).

Bonnefous '606 teaches all the limitations of the claimed invention except for
expressly teaching evaluating distensibility *as the ratio of the dilation by the diameter of
the artery*.

Bonnefous '771 teaches evaluating the elasticity as a ratio of the dilation of the
diameter of the artery (col. 5, ll. 51-67; col. 6, ll. 1-30). The examiner is interpreting the
determination of an arterial elasticity to include evaluating distensibility because
Bonnefous '771 is heavily concerned with manipulating the dilation curves and
determining elongation values (claim 5). It would have been obvious step to one of
ordinary skill in the art to record the slope of a dilation curve that is calculated by
Bonnefous '771 (col. 3, l. 58- col. 4, l. 7), thereby evaluating distensibility *as the ratio of
the dilation by the diameter of the artery*.

It would have been obvious to one of ordinary skill in the art at the time of the
invention to modify Bonnefous '606 with Bonnefous '771. The motivation to modify
Bonnefous '606 with Bonnefous '771 would have been to use and manipulate the image
data to acquire standard values that are well known in the art and are commonly used
to describe the health of an artery.

Claims 11 and 13-14 do not contain any feature which, in combination with the features of any claim they refer meet the requirements of novelty and/or inventive over Bonnefous '606. Therefore, the same reasoning from claims 1 and 7 applies *mutatis mutandis* to the subject matter of the corresponding claims 11 and 13-14.

4.   Claims 2-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bonnefous '606 in view of Bonnefous '771 as applied to claim 1 above, and further in view of Hall et al. (USPN 6,508,768).

Bonnefous '606 in view of Bonnefous '771 teaches all the limitations of the claimed invention including selecting a reference image as a starting image among the images of the sequence (Bonnefous '606: col. 4, lines 51-55) and drawing lines, called paths, representing the artery walls in the starting image (Bonnefous '606: col. 4, lines 25-55). Bonnefous '606 in view of Bonnefous '771 also teaches selecting a starting pixel in a reference image for creating new path structures and integrating the displacements over the longitudinal arterial axis (Bonnefous '606: col. 8, ll. 11-36); drawing a portion of the path between the starting pixel and second selected pixel in the starting image (Bonnefous '606: col. 8, ll. 51-57; col. 9, ll. 1-41); storing the path in memory (Bonnefous '606: col. 5, ll. 9-16); drawing portions of the path along the length of the vessel where the paths are selected using linear regression and storing the optimal paths to memory (Bonnefous '606: col. 9, ll. 12-41). Bonnefous '606 in view of Bonnefous '771 also teaches estimating the value of the pixels based on their gradient at the pixel in the ultrasonic image (Bonnefous '606: col. 9, ll. 12-22). Bonnefous '606 in view of

Bonnefous '771 also teaches that the automatic rigid tracking means for tracking the corresponding artery walls in other images of the sequence comprises means for path finding including means for: defining regions of interest around the paths drawn in the starting image and using the same regions of interest in other images of the sequence (Bonnefous '606: col. 5, ll. 64-67; col. 6, ll. 1-5); selecting a current image next to the starting image (Bonnefous '606: col. 5, ll. 18-27); initializing the tracking of the paths in the current image to fit the walls in the current image (Bonnefous '606: col. 5, ll. 10-17); and iterating these path finding steps until the beginning and end of the sequence are reached (Bonnefous '606: col. 6, ll. 39-45). Bonnefous '606 in view of Bonnefous '771 also teaches that the tracking function performs evaluation of individual points based on the gradient at the point in the ultrasonic images calculated for all the images of the sequence, considered as a two-dimensional image corresponding to an arterial volume of over a period of time (Bonnefous '606: abstract; col. 2, l. 43- col. 3, l. 20).

Bonnefous '606 in view of Bonnefous '771 does not expressly teach drawing lines, called paths, *assisted by a path search technique based on the minimization of a cost function.*

Hall et al. '768 teaches as state of the art drawing lines which are linked to elasticity modulus which are assisted by a path search technique based on the minimization of a cost function (col. 16, lines 28-35).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bonnefous '606 in view of Bonnefous '771 with Hall et al. '768 because Bonnefous '606 in view of Bonnefous '771 teaches drawing the paths using

know regression methods (Bonnefous '606: col. 9, ll. 20-23). The motivation to modify

Bonnefous '606 in view of Bonnefous '771 with Hall et al. '768 would have been to

accurately and repeatably draw the artery walls using a well known algorithm.

5.   Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Bonnefous '606 in view of Bonnefous '771 as applied to claim 1 above, and further in

view of Bonnefous (Pub. No. 2001/0031921).

Bonnefous '606 in view of Bonnefous '771 teaches all the limitations of the

claimed invention except for expressly teaching that the system includes a color display

means to display colored paths for the artery walls and colored patterns for the wall

dilation superimposed on the ultrasonic images. Bonnefous '606 in view of Bonnefous

'771 also does not expressly teach a suitably programmed computer of a workstation or

a special purpose processor having circuit means, which are arranged to process

ultrasonic images, having means to display the processed images, and having a user

interface such as a mouse or a keyboard to permit the user of interacting on the

respective images of the sequence in order to display the quantified parameters related

to the artery walls.

In the same field of endeavor, Bonnefous '921 teaches that the system includes

a color display means to display colored paths for the artery walls and colored patterns

for the wall dilation superimposed on the ultrasonic images (abstract). Bonnefous '921

also teaches a suitably programmed computer of a workstation or a special purpose

processor having circuit means, which are arranged to process ultrasonic images,

having means to display the processed images, and having a user interface such as a

mouse or a keyboard to permit the user of interacting on the respective images of the

sequence in order to display the quantified parameters related to the artery walls (claim

9).

.It would have been obvious to one of ordinary skill in the art at the time of the

invention to modify Bonnefous '606 in view of Bonnefous '771 with Bonnefous '921. The

motivation to modify Bonnefous '606 in view of Bonnefous '771 with Bonnefous '921

would have been to highlight the displacements such that they are readily and easily

exploitable for a cardiologist to utilize.

6.   Claims 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Bonnefous '606 in view of Bonnefous '771 as applied to claim 1 above, and further in

view of Hall et al. '768.

Bonnefous '606 in view of Bonnefous '771 teaches all the limitations of the

claimed invention except for expressly teaching that the transducer array is a curved

transducer array.

In the same field of endeavor, Hall et al. '768 teaches that it would have been

obvious to one of ordinary skill in the art to use a curved linear array (col. 13, ll. 20-34).

The motivation to modify Bonnefous '771 in view of Hall et al. '768 would have been to

use an array that produces more focused ultrasonic beams thereby improving the

accuracy or precision of the system.

7.   Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Bonnefous (Pub. No. 2001/0039382).

Bonnefous '382 teaches an image processing system for processing images in a

sequence representing a segment of artery explored along its longitudinal axis, said

segment showing moving walls (abstract); the system comprising a processor

configured to: track artery walls detected in an image of the sequence in other images

of the sequence [0054-0055] and evaluate artery wall motion and dilation for display of

the images together with parameters that include the distensibility being a ratio of

dilation by a diameter of the artery [0054;0055; 0056]. Bonnefous '382 et al. also

teaches that the artery walls are detected through user interaction [0058; 0062]. The

examiner is interpreting the determination of an arterial elasticity to include evaluating

distensibility because Bonnefous '382 is heavily concerned with manipulating the

dilation curves and determining the artery diameter at any moment in a cardiac cycle. It

would have been obvious step to one of ordinary skill in the art to record the slope of a

dilation curve that is calculated by Bonnefous '382 thereby evaluating distensibility *as*

the ratio of the dilation by the diameter of the artery.

8.   Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Bonnefous '382 as applied to claim 15 above, and further in view of Hall et al.

Bonnefous '382 teaches all the limitations of the claimed invention including

selecting a reference image as a starting image among the images of the sequence

corresponding to the cardiac cycle [0034; 0038; 0048]. Bonnefous '382 does not

expressly teach that the path search technique based on the minimization of a cost function.

Hall et al. '768 teaches as state of the art drawing lines which are linked to elasticity modulus which are assisted by a path search technique based on the minimization of a cost function (col. 16, lines 28-35).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bonnefous '382 in view of Hall et al. '768. The motivation to modify Bonnefous '382 in view of Hall et al. '768 would have been to accurately and repeatably draw the artery walls using a well known algorithm.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ellsworth Weatherby whose telephone number is (571) 272-2248. The examiner can normally be reached on M-F 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eleni Mantis-Mercader can be reached on (571) 272-4740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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